

Fig. 1

POISONOUS SNAKES IN SIAM

By

Dr. Chaloem Puranananda

Director of Queen Saovabha Memorial Institute

(Pasteur Institute)

Siam, being a tropical country, occupies the major part of Malay Peninsula, extends from 6-20 degrees north of equator. The surface covers an area of 200,000 sq. miles and can be divided physiographically into 4 regions (fig. 1). The north and north west highlands are hilly starting from 600-5,000 feet elevation with plenty of teak forests and wolfram mines. Certain parts of this region which have irrigation can produce two crops of rice a year. Below this region is the Chao Phya plain and low-land of rice fields extending from latitude 16° - 13° the lower part of which is a delta of Chao Phya river opening into the gulf of Siam. The elevation is at sea level and the profession of the population of this part is mainly rice growing. The north-east plateau of the third region occupies a quarter of the whole area. In spite of a number of rivers this area is very dry except during the rainy season. People can produce only one crop of rice a year and this is usually unreliable. The fourth region is the peninsula extending from 13 degree to 6 degree southward. Ranges of mountains extend the whole length of the peninsula in the middle as well as on the frontiers of Burma and the Federation of Malaya. The soil is sandy yet rice can be grown through the peninsula but the main economic interests are fishing, tin mining and rubber plantation.

Siam, being in the tropical zone with its surface of low land and many jungles, has as its fauna more than thirty kinds of snake, both deadly and non-deadly poisonous ones. The majority of them prefer to live in swampy area while others prefer the thick jungles and a few of them in the sandy soil such as on the seashore and in tin mines. Apart from these there are five kinds of salt water snakes (seasnakes), two of them are deadly poisonous.

The aim of this article is to bring a knowledge of the distribution of snakes in various parts of the country especially the deadly poisonous ones. As the majority of the population are engaged in rice growing, timber falling, mining and fishing, they should know what kinds of deadly poisonous snakes are found in their area, how to avoid and how to cope with the accident once it happens.

Among the four regions described above only the third region, which is plateau, is the less infested because it is the nature of the snake to live in swampy area where there is water most of the year. The other three regions are infested with deadly poisonous snakes. Amongst them you can find the king cobra (*Naja bungarus*, fig. 2), cobra (*Naja tripudians*, fig. 3), banded krait (*Bungarus fasciatus*, fig. 4), and russell's viper (*Vipera russellii*, fig. 5), and in the sea there are two kinds of deadly poisonous snake.

It is impossible for the author to survey each area for the different kinds of snakes in each region. It is, therefore, contented with two other means of survey. One is to survey the number of cases of snakebite in each province and what kinds of snakes are responsible. The other way is to induce inhabitants of each region to supply snakes to the Institute at various prices which depend on the toxicity of their venom, the number of its population and the difficulties in handling them. The seasonal variation of the growth of the snake leads us to study its life cycle. Knowledge of its habit and manner of reproduction enable us to obtain a reasonably complete knowledge of its life history, geographical distribution and dangers inflicted on the population by the snakes of such region. This enables us to get a rough idea of how much sera are needed for the treatment of snakebite cases in the country. The sera of each specific are sent to various dispensaries all over the country according to the distribution of the snakes and with a scheme of buying every snake at sight we assure the people that this problem of snake bite is properly dealt with and that we can hope to eradicate it in not too distant a future.

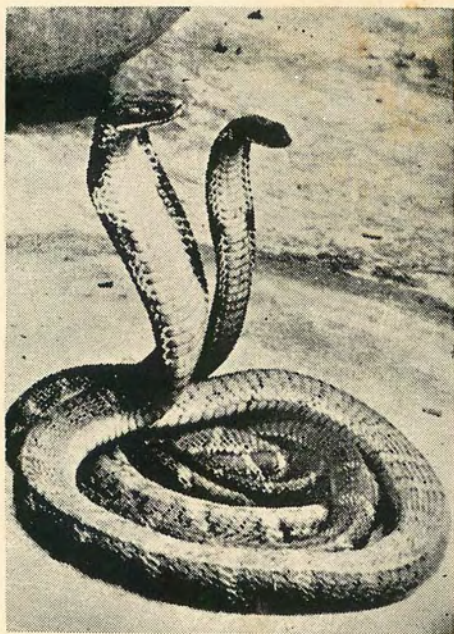


Fig. 2



Fig. 3



Fig. 4



Fig. 5

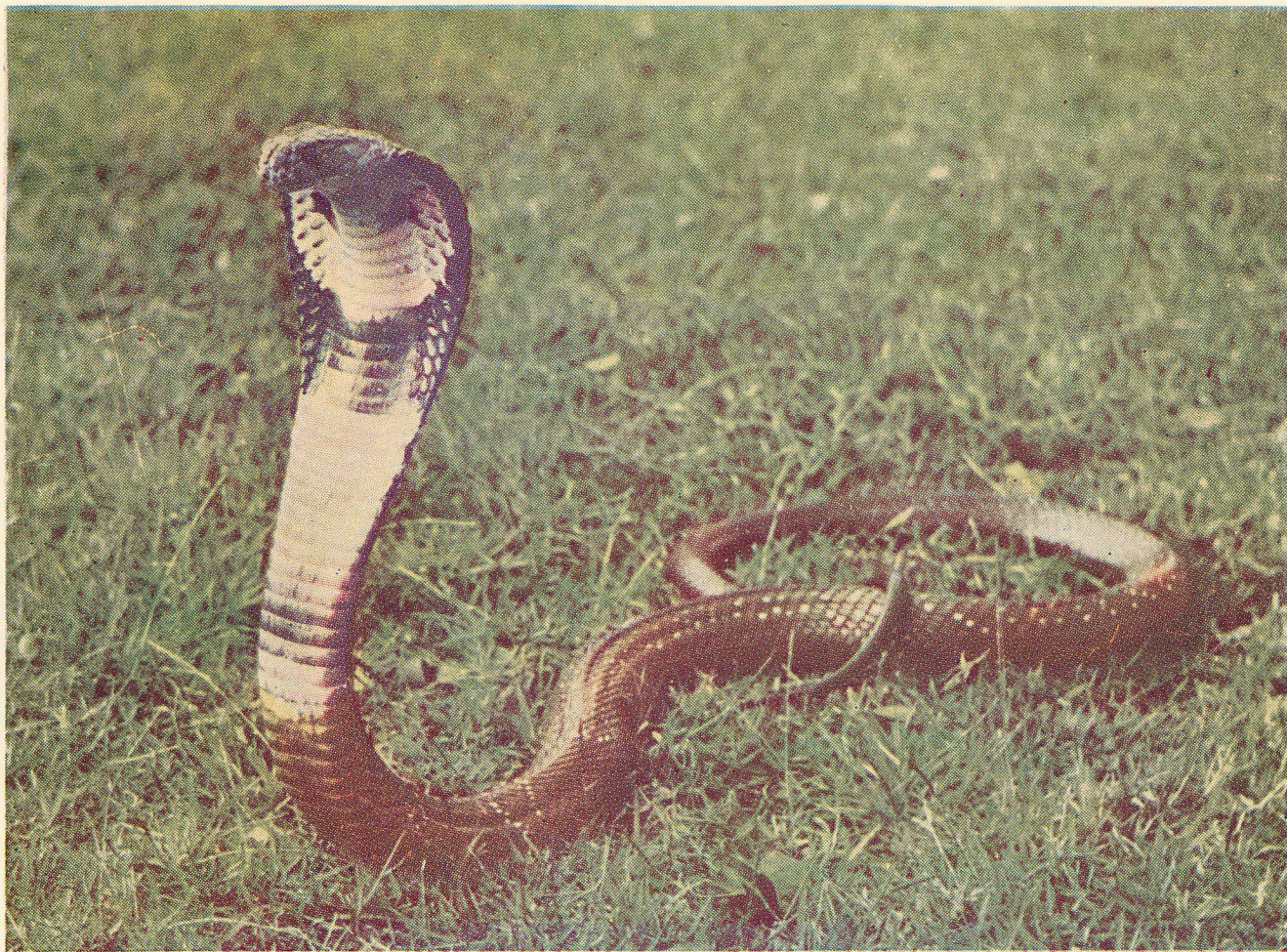
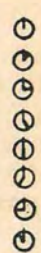


Fig. 6

Fig. 7

MAP OF THAILAND SHOWING DISTRIBUTION OF SNAKES

จังหวัดที่มีพิษขุขุ่ม



งูแมวเซา RUSSELL'S VIPER
 งูค้ออัน DISLEIRA ORNATA
 งูเขียวหางไหม้ GREEN PIT VIPER
 งูคอก: ANCISTRODON RHODOSTOMA
 งูล้ามเหลี่ยม BANDED KRAIT
 งูจงอาง KING COBRA
 งูเห่า COBRA



1. CHAI-MAT
2. SINGH-BURI
3. LOPBURI
4. BANG-BURI
5. ANG-THONG
6. ATUPHYA
7. NONG-BURI
8. PATHUM-THANI
9. THONBURI
10. PHU-NAPHONG
11. NAKHONSIYAM
12. PHRACHINBURI
13. BANPUK
14. CHA-CHENGSAO
15. CHOLBURI
16. NAYONG
17. CHANT BURI
18. TRAT
19. CHAYA PHUM
20. NAKHONSIYAM
21. BURI-RAM
22. SURIN
23. SRISAKET
24. UDONRAT-THANI
25. NONG-KHAI
26. LOXI
27. UDON-THANI
28. SAKONNAPHONG
29. NAKHONPHANOM
30. KHON-KAEN
31. NAKHONSIYAM
32. KALASIN
33. NONG-KHAI
34. NONG-SONG
35. CHITTHOMAI
36. CHITTHOMAI
37. LAMPHUN
38. LAMPHUN
39. PHRAE
40. NAI
41. UTTARADIT
42. TAK
43. SINGH-THAI
44. PHITSULOK
45. KAMPHANGPHET
46. PHICHIT
47. PHETCHABUN
48. NAKHONSIYAM
49. UTHAI-THANI
50. KANCHANA-BURI
51. SUPHABURI
52. NAYBURI
53. NAKHONSIYAM
54. SAMUTSONGKHRAM
55. SAMUTSAKHOEN
56. PHETBURI
57. PHRACHUAP-KHIRIKHAN
58. CHUNPHONG
59. NAKHON
60. PHRANG-NOA
61. SUNAT-THANI
62. NAKHONSIYAM
63. PHUKET
64. KRABI
65. THAI
66. PHATTHALUNG
67. NANTH
68. SONO-KHAI
69. PATTANI
70. YALA
71. NAKHONSIYAM



Trans Planting
Fig. 8



Floating Rice, Central Plain
Fig. 9



Fig. 10

According to the above survey we are able to demonstrate that the second region is heavily infested with cobra (*Naja tripudians*), russell's viper (*Vipera russellii*) and banded krait (*Bungarus fasciatus*) and all of them are deadly poisonous.

The cobra which is the most prevalent in this area is classified by Calmette as *Naja tripudians* (fig. 6) and is mostly found in the following provinces: Samutprakan, Lopburi, Saraburi and the others as seen in the map (fig. 7). It inhabits the rice fields and changes its domicile according to the seasons. It can swim, dive, climb trees and slide on the land. In the dry season it goes into the holes which were dug by rats and mice and stays there taking rats and mice as its food because the rodents will come back to their holes after going out to find their food. The cobra just lies there and eats them one after the other through the dry season which is thus considered as hibernation. In the true sense the cobra has a permanent supply of food until the last owner of that hole is eaten and if it is lucky it can find another hole to live in which will last the whole dry season, which in time lasts until the end of May in this country. The rainy season will start the end of May or early June. When the soil is soft with water certain kinds of insects will be found all over the field which served as food for the snakes and other reptiles. This will last until the rain is heavy enough and water rises in the rice fields. There will be a number of frogs of various descriptions which the snake will use as its food. During this period the snake will come out of the hole, swim, dive and slide or even climb trees depending on its surrounding. This season extends from August to November which is the rice growing period. Farmers have to work in the water in planting rice (fig. 8) and the harvesting of hundred-day rice under water (fig. 9). They thus expose themselves to attacks from snakes though the habit of the snake is not to attack at sight but only when they are frightened or hurt. The harvest season starts in December and ends in January when the water level is getting lower and lower until the fields are completely dry. Luckily for the snake a number of field rats and mice abound. During this season from the end of January the cobra starts laying

eggs, about 40 at a time. It is an oblong egg with soft but tough shell about the size of a big olive. It takes 4 weeks to hatch and the young cobra to come out (fig. 10). The young snake survives on flies and insects but they mostly die under captivity.

When a cobra is going to attack it rears up its head and spreads its hood which equivalent to a guard and makes a noise like blowing wind through your nose at short intervals. Then it will strike at an opportune moment. The period between rearing up and striking can be executed in a very short time.

The banded krait is classified by Calmette as *Bungarus fasciatus* (fig.4) and is the habitant of the same region as the cobra. It is a sluggish snake being blind during the day and goes out for food during the night. It has its life history somewhat like the above mentioned cobra but when it attacks it strikes at once without rearing up or spreading its hood. The number of this kind of snake is getting less and less.

The Russell's viper is classified by Calmette as *Vipera russellii* (fig.5). It is the next highest, as far as numbers are concerned, to the cobra. It lives in the central region in various provinces as shown in the map. Its life history is different from the cobra in view of the fact that it is a viper. When it gives birth to its young it lays eggs which are hatched immediately. Their food is similar to that of the others. The Russell's viper prefers a dry surrounding. It can swim but it seldom dives; it prefers to be on land or on trees. When it is going to attack it coils its body and retracts its head, then shoots out swiftly with extreme agility. It makes hissing sound when it is annoyed or angry. The duration of its sound is longer than that of the cobra.

The king cobra is classified by Calmette as *Naja bungarus* (fig.2). It can be found also in the central region, in the orchards of Thonburi and Samutprakan but is very rare. It is more prevalent in the jungle of Malay Peninsula especially in Nakhon Si Thammarat and other provinces as shown in map. It is believed that the king cobra is one of the snakes that will attack people at sight but this is not confirmed except in cases of provocation. It is

a big and long snake and can attain the length of 5 yards. It prefers to stay in the swamp and it can swim, slide on the ground and climb trees. It moves with speed both on land and in water and like the cobra it lays eggs. It lives on prey like the other snakes but it eats also other kinds of snakes. As it is the largest of these snakes it possesses a pair of big venomous glands. Once it bites anybody a large quantity of venom is injected. The patient has a small chance to survive. When it is about to attack it rears up and spreads its hood like the cobra.

The *Ancistrodon rhodostoma* as classified by Calmette (fig. 11) is a pit viper which is found in the fourth region and east coast of the gulf of Siam in various provinces as shown in map fig. 7. It is small in size but a very venomous viper. Its life history is like the russell's viper, but when it lays eggs, which are about 20-40 at a time, the eggs stick together in a form of a clump like a bunch of grapes and take 4 weeks to hatch like the cobra. The egg-laying season varies according to the area: north of the province of Prachuap it lays eggs around the month of May and hatches just the beginning of the rainy season but in the provinces south of Prachuap it lays eggs in August. This is due to the fact that the rainy season starts later in the southern provinces. The *Ancistrodon rhodostoma* attacks people in the same style as russell's viper.

The above mentioned 5 species of snakes are the deadly poisonous ones found in this country. There are two of five kinds of seasnakes that are deadly poisonous but they were described in detail by Dr. Smith of the Fishery Department of the Siamese Government in his work on the subject. The next less important groups of snakes are the non-deadly poisonous ones. They are the snakes whose bite leaves marked local symptoms, pain and swelling but will not cause death to the victim except in cases the bite is into the blood vessels. The most prevalent one is the green snake with red tail, *Lachecis Gramineus* as classified by Calmette (fig. 12) is found in and around the compound of the house. Its bite is the most painful with swelling and local haemorrhage under the skin. It belongs to the viper family. The other green snake, which is

found on bushes in the garden, belongs to the cobra family (*Dryophis Prasinus*, fig. 15). It frequently bites the gardeners and children going out picking flowers. The symptoms are less severe than the preceding one. Apart from these there are more than 30 kinds of non-deadly and non-poisonous snakes in the country.

It is very important for the public as well as the medical profession to know about the symptoms of snakebite cases, the first aid and the treatment to be given. If a patient is bitten by deadly poisonous snake the local symptoms are not outstanding. There is only slight pain, slight swelling and numbness or subcutaneous bleeding but the general symptoms are more marked depending on whether it is a nerve or blood poison. This is distinctly different from the bite of non-deadly poisonous snakes whose symptoms are more marked locally, and more pain is experienced. The swelling is outstanding but there will be no general symptoms.

The cobra is the most prevalent snake in the country especially in the central region. Its venom acts on the nervous system. The local symptoms consist of slight swelling, a little pain and numbness at the site of the bite. The general symptoms are difficulty of breathing, drooping of eyelids, and feeling of a swollen tongue. The mouth usually contracts, hiccoughing and vomiting, involuntary emission of urine and faeces occur in the later stage and the patient dies of respiratory failure. During this time the heart still goes on beating up to 2 hours after the cessation of respiration. In cases of Russell's viper bite the local symptoms will be slight pain, numbness and subcutaneous haemorrhage around the entrance of the fangs. The general symptoms will be on the circulatory system which compose of bleeding under the mucous membranes: epistaxis, bleeding through the gum, in the urine and faeces. A few hours later the patient falls into a stupor, insensibility and somnolence set in and later the patient dies of circulatory failure. If the patient comes in with both blood and nervous symptoms it can be a case of seasnake bite if the accident happens in the mouth of the river or canal where brackish water comes up from the sea. It is seldom that a seasnake will bite anybody in the sea. If the accident happens on land, it is a case of banded-krait

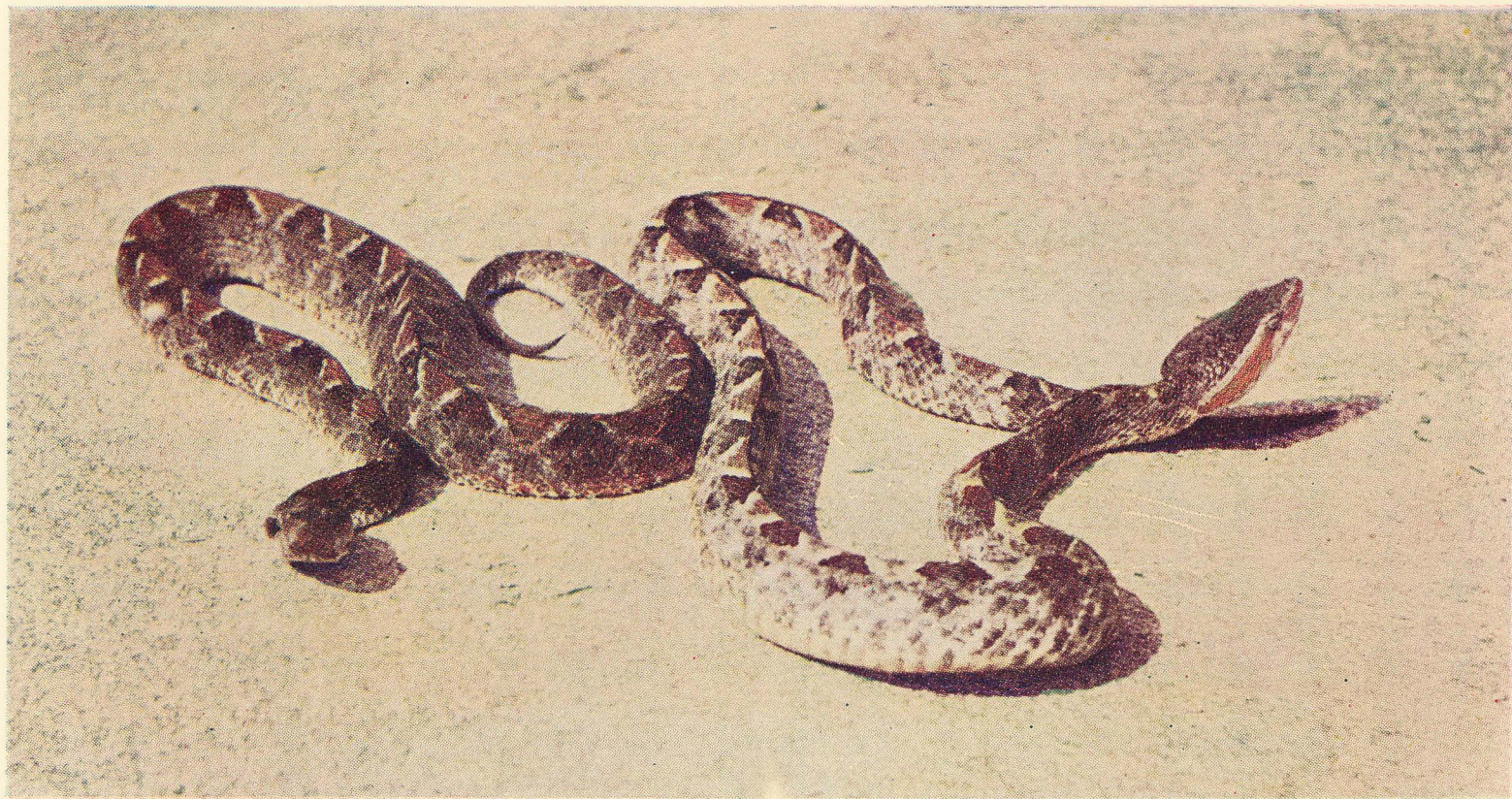


Fig. 11



Fig. 12

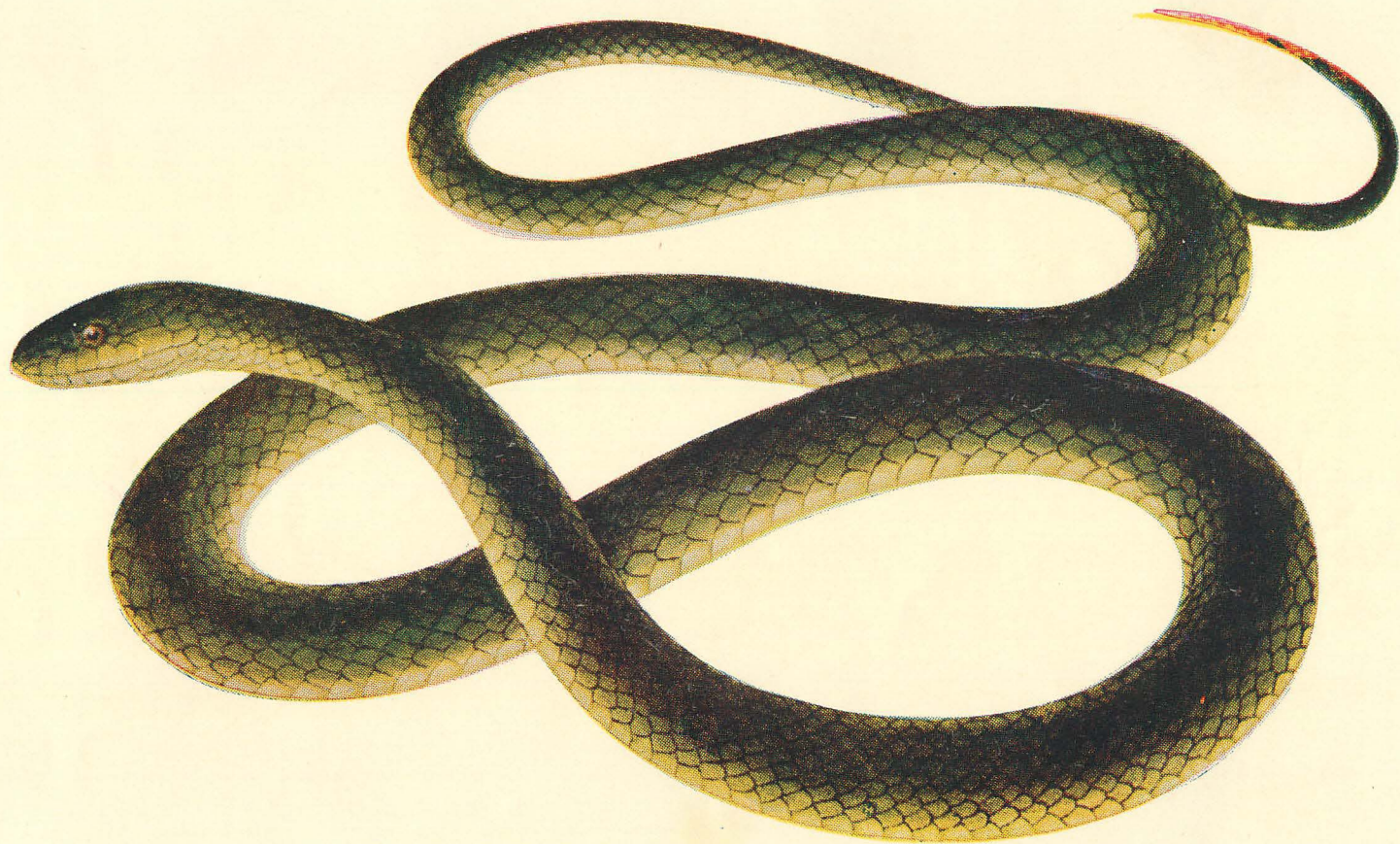


Fig. 13

bite. In the case of king cobra bite the patient seldom survives due to the large amount of venom being inoculated. If a patient is bitten by *Ancistrodon rhodostoma* there will be marked subcutaneous haemorrhage at the site of the bite which later on turns to gangrene with blood symptoms. If the patient survives usually there is gangrene of the part which needs amputation. If the serum is given in time the patient always survives and gangrene will not happen.

By the above differentiation of symptoms one can be able to conclude whether the victim is bitten by a non-deadly or a deadly poisonous snake. If it is a non-deadly poisonous one only symptomatic treatment is required which is the relieving of pain by blocking fibres of nerves by novocaine and application of hot or cold to improve circulation which will reduce the swelling. If it is a case of deadly poisonous snake a specific antivenene serum must be used in a quantity enough to cure the symptoms without recurrence. In cases of much bleeding, saline and blood transfusion are indicated. In the former days when the symptoms of each kind of snakebite were not observed carefully they used polyvalent serum but now we urge the using of specific serum in order to get better results and reduce the use of an unnecessary quantity of serum which in many case gives rise to cases of serum sickness.

A tourniquet should be applied immediately nearest to the wound and between the wound and the heart. This should be released every two hours after applying another tourniquet about an inch further from the wound until he gets the serum.

According to the statistics obtained from the Queen Saovabha Memorial Institute where snakebite cases were treated from 1923-1953 Table I, the number increased each year until it is about one thousand cases a year but the seasonal prevalence is between the month of September to December. The statistics in the provinces obtained from the Ministry of Public Health during the last 3 years are given in Table II A, B, C, D.

The Snake Farm has a budget to buy living snakes for the purpose of collecting venom which is used for the production of antivenene serum. Attention is drawn to the number of snakes

bought each year. The cobra is the most prevalent snake, but during the last 4 years there has been a definite decrease in the number obtained as seen in the following figures :

A.D.	1952	-----	1,817
	1953	-----	1,600
	1954	-----	1,262
	1955	-----	730

Most of them were brought from Samutprakan, Lopburi, Saraburi, Ayuthaya, Angthong, Thonburi and Nonthaburi by order of quantity.

The supply of other kinds of snake is still irregular and no conclusion could be drawn from the statistics.

The statistics of snakebite cases in region 2 and the (Table II B) number of snakes bought from various provinces show that they are mostly from region 2. Region 4 supplies *Ancistrodon rhodostoma* and king cobra. This knowledge guides us to supply more serum to region 2 for the treatment of cobra, Russell's viper and banded krait and for the treatment of king cobra. *Ancistrodon rhodostoma* bite in region 4. As for regions 1 and 3 a reasonable amount of antivenene serum is also distributed.

Instruction of the public in the habits of snake becomes very important. We know that the snake does not attack at sight. They will attack only on provocation: frightened, hurt, etc. The other occasion that the snake will attack is to over power his prey. The snake will go out to find its food in the night starting from dusk to dawn. The accident usually happens in the evening when the farmers return from their work and less often early in the morning when the farmers go out to work. To avoid such an accident the farmers should be instructed to make more noise while walking so that it will scare the snakes away instead of stepping on them and get bitten. The other means to reduce accident is to reduce the number of snakes at large which can be done by encouraging the farmers to go out hunting for snakes and bring them to us alive or dead. The authorities will in turn, pay the farmers according to the number they bring in. By doing this we

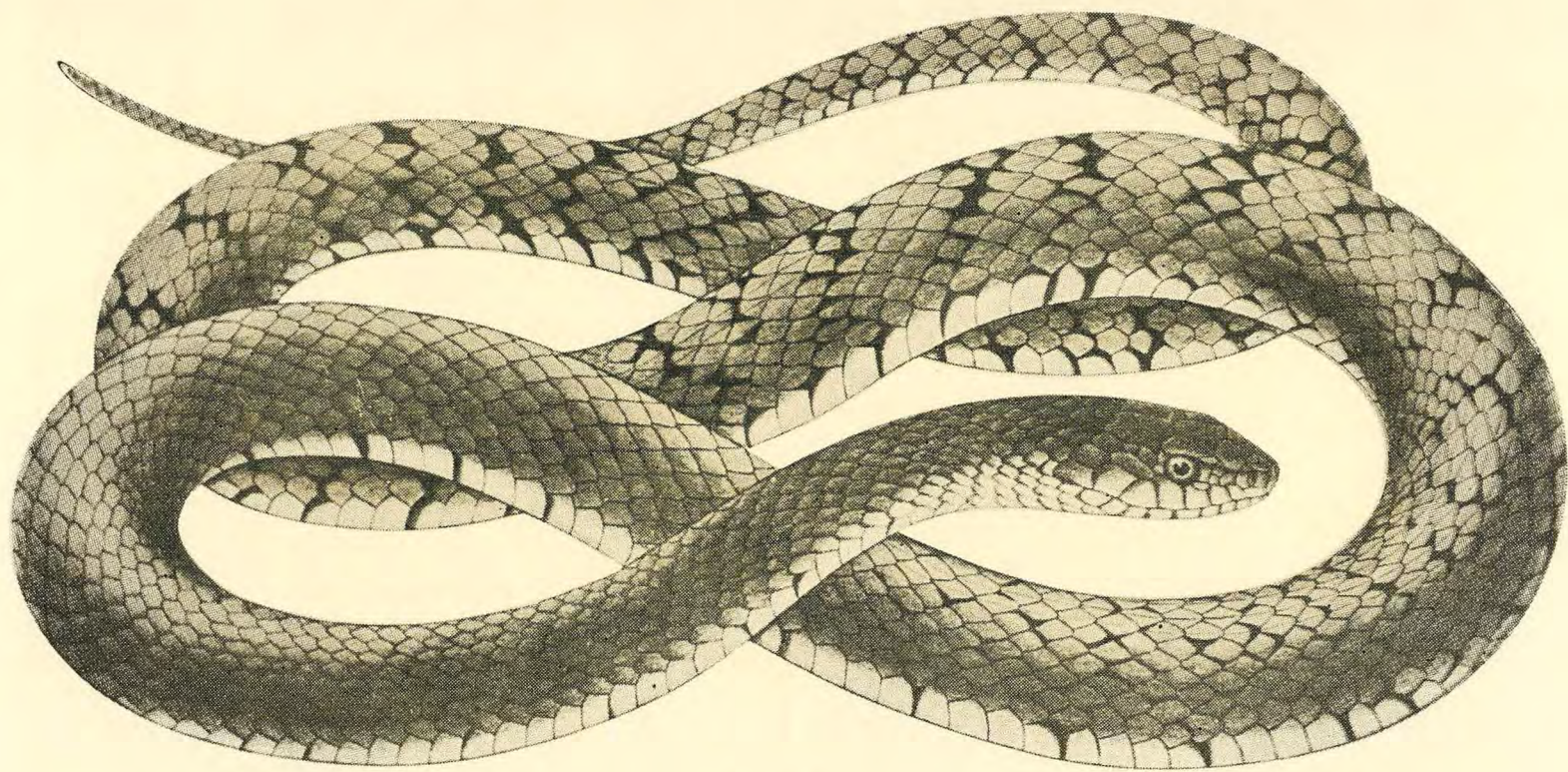


Fig. 15



Fig. 16



Fig. 17



Fig. 18

not only reduce the number of snakes at large but also reduce the reproduction potentiality. The next step to be carried out is to hunt the eggs during the egg-laying season and destroy them before they are hatched. It is also to be remembered that the snake is the agent responsible for the increase and decrease of rodent population in the rice fields during the harvest season. Therefore if we have done it to an extreme the number of rats and mice will have a tendency to increase.

The snake population of Siam is found to be most prevalent in the region 2 which is the central plain of the country where people are engaged in rice planting. The next region is region 4 which is the continuation of the region 2 along the Malay Peninsula as far as the Malayan frontier. The fauna is different: cobra, Russell's viper and banded krait are found in region 2 and king cobra and *Ancistrodon rhodostoma* are more prevalent in region 4. Regions 1 and 3 are less infested respectively. As most of the population are exposed to snakebite, it is important to find ways and means to reduce the number of snakes at large, to produce enough antivenene serum to be used for the treatment once the accident happens and also to educate the people to try to avoid the accident as well as to know how to give first aid for himself or the other victims. Complete eradication of snake is also aimed at through breaking its live-cycle at full growth and early stage of its life by destroying its eggs.

	315.1	315.1
	311.1	311.1
6	352.1	352.1
0	109	109
2	227	227
7	388	388
1	191.1	191.1
	719.1	719.1
	868.1	868.1
	610.5	610.5
	668.1	668.1
8	710.5	710.5
	007	007
	116	116
	774	774

<i>Year</i>	<i>Cases treated at the Institute</i>	<i>Deaths</i>
1917	45	—
1918	44	—
1919	48	—
1920	74	—
1921	74	—
1922	93	—
1923	176	—
1924	283	—
1925	312	—
1926	431	1
1927	497	1
1928	608	4
1929	749	2
1930	785	1
1931	812	2
1932	878	—
1933	1,026	—
1934	1,068	—
1935	1,167	—
1936	1,146	—
1937	1,315	1
1938	1,299	—
1939	1,300	1
1940	1,345	—
1941	1,418	—
1942	1,258	2
1943	894	6
1944	823	2
1945	806	1
1946	1,191	1
1947	1,243	—
1948	1,368	—
1949	2,046	—
1950	1,855	—
1951	2,087	5
1952	799	—
1953	481	—
1954	417	—

Table I

Region 2.

Province	A.D. 1951		A.D. 1952		A.D. 1953		total Number	
	bitten	dead	bitten	dead	bitten	dead	bitten	dead
Kanchanaburi	14	—	36	—	38	—	88	—
Kamphaengphet	26	—	—	—	14	—	40	—
Chanthaburi	85	6	117	8	92	5	294	19
Chachoengsao	97	—	84	1	98	—	279	1
Chainat	6	1	15	4	16	—	37	5
Chonburi	42	—	67	1	52	1	161	2
Tak	14	—	11	1	13	—	38	1
Trat	16	2	12	1	14	1	42	4
Nonthaburi	28	—	53	1	72	2	152	3
Nakhonayok	18	—	26	—	36	4	80	4
Nakhonsawan	114	2	149	3	118	3	381	8
Nakhonpathom	26	—	19	—	35	—	80	—
Patoomthani	78	—	64	1	57	—	199	1
Prachuapkhirikhan	—	—	15	—	22	—	37	—
Prachinburi	3	—	18	2	15	2	36	4
Bangkok	91	9	100	10	92	4	283	23
Thonburi	16	—	5	5	8	3	28	8
Ayuthaya	72	5	66	5	77	3	215	13
Phetchaburi	12	3	6	—	9	3	27	6
Ratburi	—	4	—	3	—	6	—	13
Rayong	82	6	61	3	18	5	161	14
Lopburi	245	18	222	6	264	8	731	32
Saraburi	39	—	40	—	46	—	125	—
Samutprakan	36	12	77	13	91	9	204	34
Samutsongkhram	4	—	4	—	17	—	25	—
Samutsakhon	60	3	75	—	115	2	250	5
Singburi	11	1	12	—	21	8	43	9
Suphanburi	56	1	54	1	71	1	181	3
Angthong	23	3	52	2	55	7	130	12
Uthai	23	4	17	2	17	4	57	10
Total	1,337	80	1,477	73	1,692	82	3,504	235

Table II B

Region 3.

Province	A.D. 1951		A.D. 1952		A.D. 1953		total Number	
	bitten	dead	bitten	dead	bitten	dead	bitten	dead
Karasin	—	—	—	—	—	—	—	—
Khonkaen	137	—	112	2	150	2	399	4
Chaiyaphum	14	—	3	—	10	—	27	—
Nakhon Phanom	15	3	20	4	17	4	52	11
Nakhon Ratchasima	30	—	20	—	26	—	76	—
Nongkhai	—	3	—	1	—	2	—	6
Buriram	20	—	19	—	33	—	72	—
Mahasarakham	91	9	69	8	61	3	221	20
Roi-et	4	—	11	4	4	—	19	4
Loei	24	2	24	—	12	1	58	3
Sakon Nakhon	63	13	61	19	55	12	179	44
Sisaket	15	8	16	7	15	8	46	23
Surin	6	—	10	2	14	2	30	4
Udonthani	10	—	8	—	8	—	26	—
Ubon Ratchathani	42	6	48	6	44	4	134	16
Total	471	44	421	53	449	36	1,337	135

Table II C

Region 4.

Province	A.D. 1951		A.D. 1952		A.D. 1953		total Number	
	bitten	dead	bitten	dead	bitten	dead	bitten	dead
Krabi	—	—	36	2	41	2	77	4
Chumphon	56	—	82	5	115	4	253	9
Trang	15	1	16	2	31	4	62	7
Nakhon Si Thammarat	8	1	8	—	20	—	36	1
Narathivat	19	3	17	—	21	3	57	6
Pattani	51	4	77	8	69	2	197	14
Phangnga	21	—	17	1	18	—	56	—
Phatthalung	15	3	12	1	12	1	37	5
Phuket	19	1	37	2	33	1	89	4
Yala	15	2	20	2	24	2	59	6
Ranong	4	—	1	—	5	—	10	—
Satun	21	3	18	1	16	1	55	5
Songkhla	58	5	55	—	38	—	151	5
Surat Thani	21	5	34	9	28	4	83	18
Total	323	28	430	32	471	24	1,222	84

Table II D